

Description

This invention relates to compositions containing mixtures of two or more pesticides and their use in the control of arthropod pests particularly insects, in, for example, agriculture, forestry, animal health, public health and for the protection of stored products and structural timber.

5-Amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphonylpyrazole (hereinafter referred to for convenience as "compound A") and thiodicarb are both useful pesticides.

The preparation and use of compound A are described, for example, in the specification of our South African Patent Application No. 88/4179 and of its equivalent United States Patent Application No. 205238.

Thiodicarb is a well known commercial product.

Mixtures of different insecticides are commonly used to control mixed infestations of different insects, the constituent insecticides having different levels of effectiveness on different insect species. Thus the chemicals are complementary in their beneficial action.

As a result of research and experimentation, it has been discovered, surprisingly, that compound A can interact with thiodicarb synergistically to give a valuable improvement in the control of pests, in particular insect pests, compared with that given by each insecticide alone.

Thus such mixtures in addition to the improved range of insect species controlled will additionally give enhanced control of insects susceptible to both compounds. This will permit an effective level of control to be maintained with a reduced amount of either or both constituents.

The invention relates to an arthropodicidal composition which comprises (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphonylpyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy]bisethanimidothioic acid dimethyl ester in association with a pesticidally acceptable diluent or carrier. Preferably the ratio by weight of (A):(B) is between 1:30 and 13:1 and most advantageously between 1:10 and 2:1.

The invention also relates to a product comprising (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphonylpyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy]bisethanimidothioic acid dimethyl ester as a combined preparation for simultaneous, separate or sequential use in controlling arthropod pests at a locus.

The invention also relates to a method of controlling arthropod pests at a locus which comprises applying thereto (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphonylpyrazole and (B) thiodicarb which is N,N'-thiobis[(me-

thylimino)-carbonyloxy]bisethanimidothioic acid dimethyl ester.

The valuable interaction of the compounds has been established by known laboratory techniques as described in the following account, in which the effect is illustrated by the mixture of compound A with thiodicarb, and its testing against a serious crop pest, the cotton leaf-worm *Spodoptera littoralis*.

Stock solutions were formulated using technical grade thiodicarb and compound A in 50% v/v aqueous acetone to give concentrations of 500ppm and 50ppm (thiodicarb) and 50 ppm (compound A). These solutions were further diluted with 50% aqueous acetone to yield a range of concentrations of compound A alone of 10, 5, 2.5, 1 and 0.5ppm and a range of concentrations of thiodicarb alone of 100, 50, 25, 10, 5, 2.5 and 1 ppm. The stock solutions were further subsampled and these subsamples so mixed, one of compound A with one of thiodicarb, to give 35 different solutions consisting of each of the abovementioned 5 concentrations of compound A combined with each of the 7 concentrations of thiodicarb. The abovementioned 47 dilutions of the compounds, alone and in combination, were used as follows.

Cotton leaf discs were set in agar in petri dishes. Four replicate dishes were assigned to each treatment and were sprayed under a Potter tower with the appropriate test dilution. When dry each dish was infected with 10 2nd instar larvae, and left to stand in a constant temperature (25°C) room. After 3 days the mean percentage mortalities of larvae were determined. These data were corrected using Abbot's correction against the mortalities in dishes treated with 50% aqueous acetone alone which served as controls.

The resulting results were analysed by the method of Tammes (1964 Neth. J. Plant. Path. 70 73-80).

Dose response lines were prepared for compound A in admixture with each of the thiodicarb concentrations, and for thiodicarb in admixture with each of the compound A concentrations. From these lines were read LC₅₀ values for 12 combinations of the two compounds. Together with the LC₅₀ values for each compound alone these provided the "observed" values plotted in Fig. 1.

The mortalities expected from given proportional mixtures were derived from the dosage mortality graphs for each compound separately, by the usual method for insecticides exhibiting joint independent action (Tammes, *op. cit.*). These provided the "expected" values plotted in Fig. 1.

The clear separation of the observed and expected lines in Fig. 1 demonstrates an unexpected advantage of the mixtures in reducing the amounts of either compound required to achieve 90% mortality, thus indicating synergism or potentiation between the two constituents.

The preferred proportions by weight of the two

active constituents of the mixture range from one part of compound A with 30 parts of thiodicarb to 13 parts of compound A with 1 part of thiodicarb. A particular preference is to mix compound A and thiodicarb in proportions of 1 to 10 to 2 to 1.

It should be understood that mixtures of other proportions are not excluded because when several different pests are to be controlled at one site and time, greater or lesser amounts of one or the other constituent of the mixture may be required to control one or more particular pests in addition to the benefit conferred by the synergistic activity of the mixture on other species present.

Claims

1. An arthropodicidal composition which comprises (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester in association with a pesticidally acceptable diluent or carrier.
2. A composition according to claim 1 which comprises (A) and (B) in a ratio by weight of from 1:30 to 13:1.
3. A composition according to claim 1 which comprises (A) and (B) in a ratio by weight of from 1:10 to 2:1.
4. A product comprising (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester as a combined preparation for simultaneous, separate or sequential use in controlling arthropod pests at a locus.
5. A method of controlling arthropod pests at a locus which comprises applying thereto (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester.
6. A method according to claim 5 which comprises the application of a pesticidal composition according to claim 2 or 3.

Patentansprüche

1. Arthropodicide Zubereitung, umfassend
(A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluor-

methylphenyl)-4-trifluormethylsulfinylpyrazol und

(B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester in Verbindung mit einem aus Pestizidgesichtspunkten akzeptablen Verdünnungsmittel oder Träger.

2. Zubereitung nach Anspruch 1, die (A) und (B) in einem Gewichtsverhältnis von 1/30 bis 13/1 enthält.
3. Zubereitung nach Anspruch 1, die (A) und (B) in einem Gewichtsverhältnis von 1/10 bis 2/1 enthält.
4. Produkt, umfassend
(A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluormethylphenyl)-4-trifluormethylsulfinylpyrazol und
(B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester als Kombinationspräparat zum gleichzeitigen, getrennten oder aufeinanderfolgenden Einsatz bei der Bekämpfung schädlicher Gliederfüßer an einem (bestimmten) Ort.
5. Verfahren zur Bekämpfung schädlicher Gliederfüßer an einem (bestimmten) Ort durch Applikation von
(A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluormethylphenyl)-4-trifluormethylsulfinylpyrazol und
(B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester auf diesen.
6. Verfahren nach Anspruch 5, bei welchem eine pestizide Zubereitung nach Anspruch 2 oder 3 appliziert wird.

Revendications

1. Composition arthropodicide qui comprend (A) le 5-amino-3-cyano-1-(2,6-dichloro-4-trifluorométhylphényl)-4-trifluorométhylsulfinylpyrazole et (B) le thiodicarb qui est l'ester de diméthyle de l'acide N,N'-thiobis[(methylimino)carbonyloxy]biséthanimidothioïque en combinaison avec un diluant ou un véhicule acceptable dans les pesticides.
2. Composition selon la revendication 1 qui comprend (A) et (B) dans un rapport pondéral compris entre 1 : 30 et 13 : 1.

active constituents of the mixture range from one part of compound A with 30 parts of thiodicarb to 13 parts of compound A with 1 part of thiodicarb. A particular preference is to mix compound A and thiodicarb in proportions of 1 to 10 to 2 to 1.

It should be understood that mixtures of other proportions are not excluded because when several different pests are to be controlled at one site and time, greater or lesser amounts of one or the other constituent of the mixture may be required to control one or more particular pests in addition to the benefit conferred by the synergistic activity of the mixture on other species present.

Claims

1. An arthropodicidal composition which comprises (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester in association with a pesticidally acceptable diluent or carrier.
2. A composition according to claim 1 which comprises (A) and (B) in a ratio by weight of from 1:30 to 13:1.
3. A composition according to claim 1 which comprises (A) and (B) in a ratio by weight of from 1:10 to 2:1.
4. A product comprising (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester as a combined preparation for simultaneous, separate or sequential use in controlling arthropod pests at a locus.
5. A method of controlling arthropod pests at a locus which comprises applying thereto (A) 5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulphinyipyrazole and (B) thiodicarb which is N,N'-thiobis[(methylimino)carbonyloxy] bisethanimidothioic acid dimethyl ester.
6. A method according to claim 5 which comprises the application of a pesticidal composition according to claim 2 or 3.

Patentansprüche

1. Arthropodicide Zubereitung, umfassend (A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluor-

methylphenyl)-4-trifluormethylsulfinylpyrazol und

(B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester in Verbindung mit einem aus Pestizidgesichtspunkten akzeptablen Verdünnungsmittel oder Träger.

2. Zubereitung nach Anspruch 1, die (A) und (B) in einem Gewichtsverhältnis von 1/30 bis 13/1 enthält.
3. Zubereitung nach Anspruch 1, die (A) und (B) in einem Gewichtsverhältnis von 1/10 bis 2/1 enthält.
4. Produkt, umfassend (A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluormethylphenyl)-4-trifluormethylsulfinylpyrazol und (B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester als Kombinationspräparat zum gleichzeitigen, getrennten oder aufeinanderfolgenden Einsatz bei der Bekämpfung schädlicher Gliederfüßer an einem (bestimmten) Ort.
5. Verfahren zur Bekämpfung schädlicher Gliederfüßer an einem (bestimmten) Ort durch Applikation von (A) 5-Amino-3-cyano-1-(2,6-dichlor-4-trifluormethylphenyl)-4-trifluormethylsulfinylpyrazol und (B) Thiodicarb, nämlich N,N'-Thiobis-[(methylimino)carbonyloxy]-bisethanimidothiosäuredimethylester auf diesen.
6. Verfahren nach Anspruch 5, bei welchem eine pestizide Zubereitung nach Anspruch 2 oder 3 appliziert wird.

Revendications

1. Composition arthropodicide qui comprend (A) le 5-amino-3-cyano-1-(2,6-dichloro-4-trifluorométhylphényl)-4-trifluorométhylsulfinylpyrazole et (B) le thiodicarb qui est l'ester de diméthyle de l'acide N,N'-thiobis[(méthylimino)carbonyloxy]biséthanimidothioïque en combinaison avec un diluant ou un véhicule acceptable dans les pesticides.
2. Composition selon la revendication 1 qui comprend (A) et (B) dans un rapport pondéral compris entre 1 : 30 et 13 : 1.



3. Composition selon la revendication 1 qui comprend (A) et (B) dans un rapport pondéral compris entre 1 : 10 et 2 : 1.
4. Produit comprenant (A) le 5-amino-3-cyano-1-
(2,6-dichloro-4-trifluorométhylphényl)-4-trifluoro-
méthylsulfinylpyrazole et (B) le thiodicarb qui est
l'ester de diméthyle de l'acide N,N'-thiobis[(mé-
thylimino)carbonyloxy]bis-éthanimidothioïque
sous forme d'une préparation combinée pour une
utilisation simultanée, séparée ou séquentielle
pour le contrôle des insectes nuisibles de type ar-
thropode à un emplacement. 5
10
5. Procédé de contrôle d'insectes nuisibles de type
arthropode à un emplacement, comprenant l'ap-
plication à celui-ci de (A) 5-amino-3-cyano-1-
(2,6-dichloro-4-trifluorométhylphényl)-4-trifluoro-
méthylsulfinylpyrazole et de (B) thiodicarb qui
est l'ester de diméthyle d'acide N,N'-thiobis[(mé-
thylimino)-carbonyloxy]biséthanimidothioïque. 15
20
6. Procédé selon la revendication 5, qui comprend
l'application d'une composition pesticide selon la
revendication 2 ou 3. 25
- 30
- 35
- 40
- 45
- 50
- 55
- 4

